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Maria Pia Prudenzano
Carlo Monetti
Lucia Merico
Valentina Cardinali
Sergio Genco
Paolo Lamberti
Paolo Livrea

The comorbidity of migraine and hypertension. A study in a tertiary care headache centre

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M.P. Prudenzano (✉) • C. Monetti
L. Merico • V. Cardinali • S. Genco
P. Lamberti • P. Livrea
Headache Disorders Centre,
Neurological and Psychiatric Sciences Department,
University of Bari,
Piazza G. Cesare 11, I-70124 Bari, Italy
e-mail: m.p.prudenzano@neurol.uniba.it
Tel.: +39-080-5592331/5478527
Fax: +39-080-5593079

Abstract Literature data concerning the comorbidity of migraine and hypertension are conflicting and lacking in consistency [1–4]. This study was designed to evaluate the distribution of hypertension in a sample of migraineurs in comparison with a group of tension-type headache (TTH) patients. Hypertension prevalence was more elevated in headache sufferers than in the general population. This finding might be due to a Berkson's bias; in fact individuals seeking medical care often show a high rate of association between two medical conditions which may be independent in the general population [5]. The highest hypertension prevalence was found in patients with TTH, supporting the hypothesis that this type of headache might be based upon vascular mechanisms [6].

Key words Hypertension • Migraine • Tension-type headache

Introduction

The nature of comorbidity between migraine and hypertension is an old issue, but literature data are conflicting and lacking in consistency. In 1913, Janeway first proposed an association between headache and hypertension [1]. A survey of the general population failed to demonstrate any association between blood pressure (BP) values and headache [2]. Weiss found the prevalence of headache to be 25% in 6672 hypertensives and reported that headache was unrelated to BP level but retinopathy was associated with higher prevalence of headache [3]. In 1992 Krogh-Rasmussen and Olesen observed that 11% of subjects from the general population had hypertension without any difference between hypertensives and non-hypertensives in headache incidence [4]. Female migraineurs showed slight but significantly elevated diastolic BP [4]. According to Mathew the presence of hypertension may lead to more severe headache and may be a possible risk factor for chronic migraine [7]. If this was true, the concomitant treatment of hypertension would be important in these patients also to prevent migraine complications. Some evidence suggests that migraine, particularly with aura and with a frequency higher than 12 attacks/year, increases the risk of stroke in young women with OR=10(2.18–49.4) [8]. From this point of view the prevention of chronic migraine might also prevent stroke occurrence. This study was designed to evaluate the distribution of hypertension in a sample of migraineurs in comparison with a group of tension-type headache (TTH) patients.

Methods

A sample of 240 adult headache sufferers (181 females, mean age 39.44±13.02 years, and 59 males, mean age 37.12±13.94 years) consecutively referred to the Headache Disorders Centre of Bari was enrolled. Patients underwent a clinical interview, a physical and neurological examination including the assessment of BP. Appropriate investigations were made when suggested by clinical suspicion. Only patients receiving diagnosis of migraine or TTH according to the criteria of the International Classification of Headache Disorders (ICHD-II) were included with the exclusion of subjects affected by both type of headache or by any other primary or secondary headache [9]. Headache was considered chronic if attack frequency was more than 15 days/month for at least 3 months [9]. Analgesic overuse was diagnosed according to ICHD-II criteria [9]. Patients were classified as hypotensive when BP was <120/80 mmHg, normotensive when BP was between 120/80 and 140/80 mmHg, and hypertensive when BP was higher than 140/80 mmHg. Data were analysed by means of SPSS 11.0 for Windows.

Results

The whole sample consisted of 195 migraineurs (167 without aura and 28 with aura) and 45 age-matched TTH sufferers. Hypertension prevalence was 33.8% in the whole sample and it was significantly higher in males (54.23%) than in females (27.07%) ($p<0.001$, Chi Square test). A positive correlation of systolic BP (SBP) levels with age at the 0.01 level of significance was observed (Pearson Correlation, $r=0.40$). Also diastolic BP (DBP) values showed a positive correlation with age ($r=0.34$, $p<0.01$). No correlation was observed between BP values and smoking. Alcohol intake was positively correlated with SBP values ($r=0.181$, $p<0.01$), but not with diastolic ones ($r=0.13$, $p=0.08$). Coffee intake positively correlated with SBP values ($r=0.14$, $p<0.05$) but not with diastolic ones ($r=0.07$, $p=0.26$). A positive correlation was observed between attack frequency with both systolic ($r=0.14$, $p<0.05$) and DBP values ($r=0.13$, $p<0.05$). Headache duration showed a positive correlation with either systolic ($r=0.23$, $p<0.01$) or DBP levels ($r=0.21$, $p<0.01$).

A family history of headache was reported by 65.43% of hypertensives and by 69.81% of non-hypertensives (Chi Square test, $p=0.49$). No difference was observed in familial history of diabetes in hypertensives and non-hypertensives (33.33% *vs*. 23.89%, Chi Square test, $p=0.12$). A significantly more frequent family history of cardiovascular disorders was shown in hypertensive headache sufferers (32.07%) than in non-hypertensives (16.35%) (Chi Square test, $p<0.001$). Hypertension occurrence was 25.00% in females taking oral contraceptives (OC) or hormonal replacement therapy (HRT) whereas it was 40.45% in females not taking OC/HRT ($p<0.05$, Fisher's Exact Test). Hypertension prevalence was significantly more elevated in chronic headache sufferers (39.50%) than in episodic ones (27.6%) (Fisher's Exact Test, $p<0.05$). No difference was found in BP values between chronic headache sufferers with medication overuse and those without (SBP: 132.31±18.32 *vs*. 132.54±23.80, $p=0.97$; DBP: 79.23±11.87 *vs*. 83.41±13.19, Student's *t*-test for independent data, $p=0.29$).

The comparison between migraine and TTH sufferers showed hypertension occurrence to be significantly lower in the former (28.71%) than in the latter (55.5%) ($p<0.01$, Chi Square test). A significant difference in hypertension prevalence was observed also when splitting the sample for gender (Fig. 1). No difference was found in SBP levels between TTH and migraine in males (141.50±16.67 *vs*. 136.63±17.98, Student's *t*-test for independent data, $p=0.49$). Also DBP levels showed no difference between TTH and migraine in males (89±5.67 *vs*. 84.80±11.27, $p=0.25$). Significantly more elevated SBP values were found in TTH sufferers than in migraineurs within the female group (134.29±27.25 *vs*. 123.31±17.28, $p<0.05$). Also DBP levels were significantly higher in females suffering from TTH than females affected by migraine (85.43±12.48 *vs*. 77.91±10.88, $p<0.01$).

No difference was found in hypertension prevalence when comparing migraineurs with and without aura, both in the whole sample and when it was split according to gender (Fig. 2).

BP levels showed no difference between migraineurs with and without aura (SBP: 141.50±16.67 *vs*. 137.79±17.97, $p=0.55$; DBP: 89.00±5.67 *vs*. 85.93±10.81, $p=0.39$, Student's *t*-test for independent data) in males. In

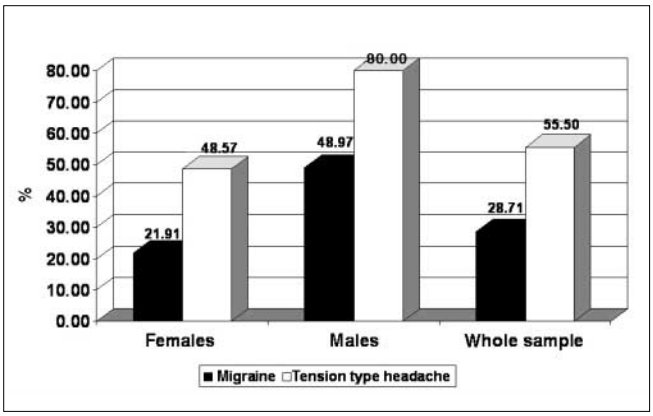

Fig. 1 Hypertension prevalence: comparison according to diagnosis and sex. A significantly higher prevalence of hypertension was found in tension-type headache patients in females ($p<0.01$), males ($p<0.05$) and in the whole sample ($p<0.001$)

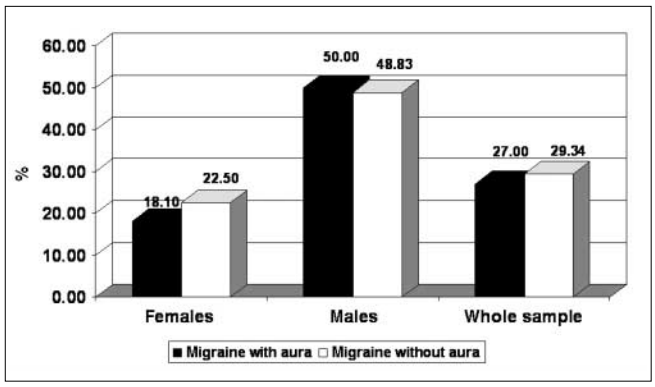

Fig. 2 Hypertension prevalence: comparison between migraine with and without aura. No difference was found in hypertension prevalence between migraine with and without aura in females, males and in the whole sample (Chi Square, ns)

the female group BP values were significantly higher in migraine with aura than in migraine without aura (SBP: 134.29±27.25 *vs*. 123.69±16.67, $p<0.05$; DBP: 85.43±12.44 *vs*. 78.19±10.30, $p<0.01$).

Discussion and conclusions

Hypertension showed a prevalence more elevated in headache sufferers referring to a tertiary headache centre (about 38%) than in the general population in which it was found to be 11% [4]. This finding might be due to a Berkson's bias; in fact individuals seeking medical care are likely to show a high rate of association between two medical conditions which may be independent in the general population [5]. The higher prevalence of hypertension in male sex and its positive correlation with age, alcohol and coffee intake are in agreement with previous literature data [10]. The role of hypertension as a factor increasing severity and frequency of migraine was confirmed [7]. If one considers that 25% of women taking OC/HRT are hypertensive, the risk of a vascular disorder becomes real in those patients as an effect of this association. The highest prevalence of hypertension, which was observed in TTH, was an unexpected result of uncertain interpretation. According to Hannerz and Jogenstrand, mean BP at baseline is more elevated in chronic TTH patients than in controls and this finding supports the hypothesis that this type of headache might be based upon vascular mechanisms [6]. Another possible explanation of the higher hypertension prevalence in TTH than in migraine might be that common therapies with beta-blocker, calcium antagonists etc. might cause a BP decrease in the latter, so further studies are requested on this topic. Both systolic and diastolic BP values have been shown to be higher in females suffering from migraine with aura than without aura, confirming the possible link of the former with stroke occurrence. Our findings failed to demonstrate the nature of the association between migraine and hypertension. Further studies are requested to clarify this conflicting issue. However BP assessment in headache patients has fundamental importance for management. Therapy for hypertension is moreover necessary to eliminate further risk of cardiovascular and cerebrovascular disease.

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